



Farmer spraying chlorpyrifos in rice fields.  
Photo: Prayong K/Shutterstock.com

**Chlorpyrifos is a widely used broad spectrum organophosphate insecticide that is highly toxic, persistent in the environment and bioaccumulates in the food chain.**

**It is particularly toxic to children, with exposure to even minute amounts capable of altering brain structure, IQ and behaviour with life long, even intergenerational, impacts.**

## OVERVIEW OF BANS AND RESTRICTIONS

**BANS:** 27 countries of the European Union, Canada, Egypt, Indonesia, Morocco, Palestine, Saudi Arabia, Switzerland, Thailand, Turkey, UK, Vietnam (*PAN Int 2022*).

**RESTRICTIONS:** USA has restricted its use to non-food crops (*POPRC/18 2022*); South Africa has banned domestic use (*Watts 2013*).

**INTERNATIONAL PHASE-OUT:** In January 2022, chlorpyrifos was found by the POPs Review Committee to meet the criteria for listing as a Persistent Organic Pollutant under the Stockholm Convention, for global phase-out. India and China remain the 2 biggest producers of chlorpyrifos (*POPRC/17 2022*).

## CURRENT USE AND EXPOSURE

**USES:** Chlorpyrifos is used to control insects on a wide range of food and non-food crops, including fall army worm and desert locusts. It is also used on ornamentals, golf courses, termite control in buildings and forestry; in animal housing; and to control adult mosquitoes, fire ants and some tick species (*POPRC/18 2022*).

**ROUTES OF EXPOSURE:** Direct exposure to chlorpyrifos is through use in farming or domestic settings (homes and gardens), and through consumption of food and drinking water containing residues. Secondary exposure is through spray drift; children playing in contaminated soil or on floors or furniture in treated homes; on pets; washing of pesticide-soaked clothing and spray equipment; reuse of chlorpyrifos containers for food or water storage. Residues in food are widespread globally, including Pakistan, India, China, New Zealand (*Watts 2013*).

## NEGATIVE HEALTH IMPACTS

### ACUTE HEALTH EFFECTS

Chlorpyrifos blocks the function of the enzyme cholinesterase resulting in the overstimulation of the nervous system causing nausea, dizziness, confusion, slurred speech, tremors, ataxia, convulsions, depression of respiratory and circulatory centres, respiratory paralysis and death. Poisonings have occurred in many countries, including India, Iran, China, Nepal, Sri Lanka, Taiwan. (*POPRC/18; Watts 2013*)



# Urgent Need to Ban the Brain-Harming Chlorpyrifos

POLICY BRIEF

## CHRONIC HEALTH IMPACTS

**The most profound chronic health impacts of chlorpyrifos are on the developing child, and particularly on the brain of the developing child. Exposure to even very low levels whilst at the foetal stage can result in structural changes in the developing brain and losses in cognitive function particularly IQ and working memory.**

These and early childhood exposures can lead to ADHD, autism and pervasive developmental disorders with long term consequences for social adjustment and academic achievement. (Watts 2013)

Endocrine disruption impacts of chlorpyrifos include those on the mammary gland – reducing oestrogen, progesterone, luteinizing hormone, and causing breast cancer cells to grow. Changes to circulating thyroid hormone concentrations in humans have also been observed. (POPRC/18; Watts 2013)

Other chronic health impacts include metabolic impacts that may predispose a person to obesity, diabetes, and cardiovascular problems later in life; immune toxicity; liver damage; kidney failure; cancer especially lung and rectal with weaker associations with obesity, diabetes, and cardiovascular problems later in life. (Watts 2013)



- Chlorpyrifos and its metabolites have been found in urine, maternal and cord blood, breast milk, cervical fluid, sperm and children's hair including in Philippines, India, Pakistan, China, Malaysia, Iran, Thailand. (POPRC/18 2022; Watts 2013).

- Higher levels of chlorpyrifos metabolites were found in New Zealand children than those in USA, Canada, Spain or Thailand, but lower than those in Australia. (Li et al 2022)

## CHRONIC HEALTH IMPACTS

- Decreased IQ
  - Loss of working memory
  - Attention deficits, like ADHD
  - Autism
  - Thyroid hormone disruption
  - Reproductive problems
  - Metabolic disturbances
  - Nerve damage
  - Parkinson's disease
- (HEAL et al 2018)

## ENVIRONMENTAL IMPACTS

- High acute and chronic toxicity to:
    - aquatic organisms
    - terrestrial vertebrates, especially to birds
    - the honey bee
    - beneficial insects and biocontrol agents
    - soil organisms and microorganisms
  - Persistent in the environment
  - Bioaccumulates in some species
- (POPRC/18 2022; Watts 2013)



Bottles of chlorpyrifos found during Community Pesticide Action Monitoring by PANAP partner organisations in India (left) and Vietnam (right)



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## ENVIRONMENTAL CONTAMINATION

Environmental contamination by chlorpyrifos is now widespread. It is found in soil, waterways, air, snow, rain, ice fog and seawater (POPRC/18 2022). In New Zealand, it has been found in waterways at levels higher than any other pesticide and it has been measured in the air high above the Southern Alps (Lavin *et al* 2012). It is present in ice in the Arctic and Antarctica (POPRC/18 2022), a long way away from where it has been used.

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## REFERENCES

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## RECOMMENDATIONS

- 1. Rapidly phase-out all uses of chlorpyrifos and replace them with agroecological practices.**
- 2. Join the growing list of countries that are banning chlorpyrifos completely – to protect our children from its toxic effects.**

*Pesticide Action Network (PAN) is a network of over 600 participating nongovernmental organizations, institutions and individuals in over 90 countries working to replace the use of hazardous pesticides with ecologically sound and socially just alternatives. Established in 1992, PANAP is one of the five regional centres of PAN.*



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